

TRAFFIC-RELATED AIR POLLUTION AT HOME AND SCHOOL AND LUNG FUNCTION IN CHILDREN WITH ASTHMA: THE CINCINNATI ANTI-IDLING CAMPAIGN STUDY

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Background and Aims: Diesel idling is a significant contributor to the concentration of traffic-related air pollution (TRAP) at schools. Previous anti-idling campaigns have been implemented, though the impact on air quality and health has been infrequently assessed. The objective of this analysis was to determine the association between exposure to TRAP at the homes and schools of asthmatic children on lung function prior to a community-based anti-idling campaign.

Methods: Four schools were selected to participate in the anti-idling campaign. Asthmatic children attending these schools and their caregivers were enrolled and completed a questionnaire and spirometry. Ambient air sampling was conducted prior to the anti-idling campaign at each school to measure the concentration of elemental carbon (EC), a marker of TRAP. Exposure to EC at the home address of each child was estimated using a land-use regression model. The association between time-weighted EC exposure and Forced Expiratory Volume in 1 second (FEV₁), Forced Vital Capacity (FVC), and Forced Expiratory Flow (FEF₂₅₋₇₅) was examined by linear regression and adjusted for height, weight, asthma medication use, number of school buses, gender, race, age, environmental tobacco smoke, and household income.

Results: A total of 102 children completed spirometry and a caregiver questionnaire. The average concentration of EC sampled at the schools was 0.62 µg/m³ and was significantly greater than the estimated EC concentration at the children's homes (0.52 µg/m³, $p < 0.01$). One interquartile (0.20 µg/m³) increase in time-weighted EC exposure was associated with significant deficits in FEF₂₅₋₇₅ [-0.26 L/s (95% CI -0.46, -0.05)] and decreased FEV₁ [-0.09 L (95% CI -0.20, 0.01)]. Exposure to EC was not associated with FVC.

Conclusions: Exposure to TRAP at homes and schools is associated with deficits in lung function among asthmatic children. The impact of the anti-idling campaign will be assessed by post intervention air sampling and repeated measurement of lung function.